

**IMPROVING THE STUDENT LEARNING OUTCOMES
OF PHYSICS SUBJECT AT CIRCULAR
MOTION TOPIC BY USING DISCOVERY METHOD**

**Classroom Action Research at class ten (X-1) at Public High School (SMAN 68)
Jakarta-Indonesia.**

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ABSTRACT

The purpose of this research is to improve the result of physics study and to achieve a minimum completeness criteria (KKM) by using discovery learning method at circular motion topic for class ten (X-1) public high school (SMAN 68) in Jakarta with the KKM value of physics subjects is 75. This research method is classroom action research by Kemmis & McTaggart. Action research with steps: 1. Plan, 2. Act, 3. Observation, 4. Reflection, which were the collaboration between university students, teacher and lecturer. They discussed the implementation of this action and evaluate the results of activity in the classroom. Method of discovery learning is a mental process which students are able to assimilate something concepts or principles, with the procedures as follows: Stimulation, Problem Statement, Data Collection, Data Processing, Verification, Generalization. This research has been done at public High school (SMAN 68) in Jakarta-Indonesia in November 2013, semester I. The sample of this research is 37 students at class ten (X-1), SMAN 68 Jakarta. This research was conducted in two cycles, each in the two meetings. Data research has been used from student learning outcomes, interviews and events in the field, which is authorized by data triangulation. In the first cycle, the result of physics study of students reached 40.5%. In the second cycle, the result of physics study of students reached 81%. The conclusion of this research is the discovery learning method can improve student learning outcomes of physics subject. The advices of this research as follow: in learning activities, the students are given the freedom and directed finding concepts and principles, seek solutions and find the knowledge that accompanies it, thus generating knowledge truly meaningful.

Keywords : Improving the result of physics study by using discovery method

1. Introduction

Physics is a subject that not only requires memorization alone, but also requires a good understanding to be able to be applied to a real object in life, so that learning becomes meaningful. However, experience has shown that in general teachers in teaching science subjects much emphasis on the provision of information only, and are reluctant to use props or lab activities that can improve student learning outcomes. (Widayanto, 2009:1).

Based on the results of the analysis showed 72% of the scientific aspects of learning skills be taught in class X is not as expected, 60% of teachers have not been up in applying scientific skill learning science class X, 80% believe that learning scientific skills impact both

on the learning outcomes of students of class X, 68% of learning scientific skills in class X there are many obstacles, 60% of teachers have been providing guidance or instructions are broad enough to students in learning activities, 56% teachers act gives problems then invite students to solve these problems through observation, experiment or research procedures, 60% teachers are less able to develop students' motivation and interest in small and large group discussions, 68% of teachers use the media used is not displaying images or demonstration, or situations that can actually be used to improve the way students think critically and creatively, and 84% that the method of discovery (invention) is effective for improving the ability of skilled scientific.

The results of studying physics class students of SMAN 68 Jakarta X.1 low on Circular Motion material because students are less interested in such material . It is also caused by several factors, including teachers , students and the environment . Factor of the teacher is the method used is the teacher lecture . In addition it provides an opportunity for teachers lacking students learn through demonstration , trial or discussion . Master Circular Motion matter less associate with everyday life . The teacher only gives information owned by a variety of mathematical decrease thus making it difficult to understand the students . In addition, students simply noted and work on the problems that the students become passive . Factor of the students are active learners lack the ask the teacher or friend about Circular Motion materials that are less understood and less able to respond to the feedback given by the teacher . Lack of time students to read the material also becomes a factor. Environmental factors that cause low student learning outcomes is the lack of laboratory equipment or teaching aids that can be used physics teachers to support learning about the physics of matter Circular Motion.

In addition to grade students of SMAN 68 Jakarta X.1 is less active in the learning process, both at the time of listening to the teacher explaining the material, and less active in questioning the material are poorly understood, also seemed less enthusiastic in learning physics, then one strategy that seems right to improve student learning outcomes is learning by discovery learning method.

Method of discovery-based learning or discovery learning is a teaching method that regulates the teaching so that children acquire knowledge not previously known not through notifications, but found himself. In discovery learning (discovery), or pembelajaran activities are designed in such a way, so that students can discover the concepts and principles through his own mental processes. In discovering the concept, students observe, classify, make allegations, explain, draw conclusions, and so on to discover some of the concepts and principles.

Based on the above, in order to achieve the learning outcomes in accordance with the planned goal, teachers need to consider effective teaching and learning strategies. Therefore it is necessary to research on "**Efforts to Improve Student Learning Outcomes in Matter Physics Circular Motion With Discovery Learning Method in class X IPA 1 SMAN 68 Jakarta**".

Problem Formulation :

- 1) How to implement discovery learning method in class X circular motion of matter in SMA N 68 Jakarta
- 2) Is the discovery learning method can improve the learning outcomes of students of class X-1 SMAN 68 Jakarta circular motion on the material in class X SMA N 68 Jakarta.

Research Objectives

To determine the application of the discovery learning method in improving the learning outcomes of students in the physics class X IPA 1 SMAN 68 Jakarta.

2. Theory Framework

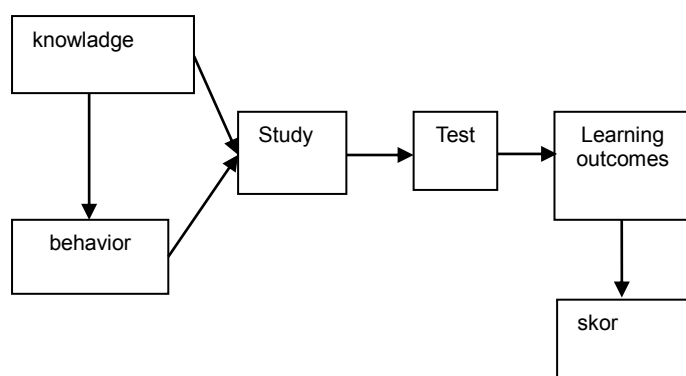
2.1 Learning Outcomes

Learning outcomes by Nana Sudjana (2009:2) is instructional objectives have been

achieved or dominated by students after they take their learning experience. Achieved learning outcomes learners and the factors that come from outside the self-learners.

The process of learning experienced by learners produce changes in the field of knowledge, in the field of skills, values and attitudes in the field. The change was evident in the learning outcomes produced by students of the question or problem tasks assigned by the teacher. But not all the changes are the result of learning. According to Rena (2007:12), the change will be the result if the study had the following characteristics: (a) changes occur consciously, meaning someone who is learning to be aware of a change, (b) Change and continuity are functional; (c) Changes in positive and active; (d) Changes not be temporary; (e) changes in learning objectives and specific directions.

Chart learning outcomes



From the chart , indicating that the learning outcomes result from the evaluation of learning activities (tests) and an evaluation study done because of the learning activities . Both the poor learning outcomes depends on the knowledge and behavior of individual perbahan pertinent to the subject. Of the various terms can be concluded that the learning outcomes are the changes that occurred in the aftermath of a learning process . The change in question is a reflection of the knowledge , skills and attitudes acquired in following the learning process of students . Therefore, learning outcomes can be observed and measured through tests . The results of the study referred to in this study is the result of learning in physics.

Minimal completeness criteria (KKM) is a reference or basic guidelines in determining achievement of student learning outcomes. The decision is based on the Ministry of National Education (DEPDIKNAS) (2008:51) minimum completeness criteria set by the educational unit based on the consensus reached disatuan subject teacher education or educational units that have some similar characteristics. Consideration educator or forum MGMPs (Subject Teachers Council) academic major consideration determination KKM. Based on the Decree of the Head of the School of SMAN 68 and MGMPs Physics, KKM value assigned to physics subjects is 75.

Based on the above , it is in this study is a physics student learning outcomes achieved by students is the knowledge on the subjects after undergoing a process of teaching physics in schools , from the results of tests , or exams given after going through the process of learning at the end of the matter . The assumption is that the knowledge taught by teachers in the subjects of physics can be optimally absorbed by the students so that the students can study describes the results of teaching.

2.2 Discovery Learning Methode

Discovery learning method was first proposed by Jerome Bruner, he argues that the discovery learning (discovery learning) according to the search knowledge actively by humans,

students learn best through discovery so it starts to look for solutions and the accompanying knowledge, generating knowledge that is truly meaningful . With the discovery learning model students' knowledge gained will be long remembered, the concepts become more easily applied to new situations and improve student reasoning (Dahar, 1989:103). Some experts argue about the invention or discovery learning, including: Bruner (in Dahar, 1989:103) argues that the discovery is a discovery learning appropriate to actively search for knowledge by humans, and by itself gives the best results. Amin (1987:126), discovery is an activity or lesson is designed so that students can find the concepts and principles through his own mental processes (observing, classifying, making allegations, explaining, measuring, draw conclusions, and so on). (in Suryosubroto, 2009:179) reveals that the discovery is a mental process in which students assimilate the principles and concepts or something. Mental processes are for example: observing, classifying, making allegations, explaining, measuring, and making inferences. Suryosubroto (2009:192) stated that the discovery is a learning process where the teacher allows her students find their own information traditionally diceramahkan informed or just plain.

Stages of Discovery Learning Model , namely: 1) Stimulation : Students are given directives to read / listen to a description that includes the problem , 2) Formulation of the problem (problem statement) : Students are given the opportunity to identify problems that arise . Of these problems , students are required to make a hypothesis as a temporary answer to the problem that has been formulated by the student , 3) Data collection : Students are given the opportunity to collect a variety of data and information that is relevant and clear , that is by the study of literature , conducting experiments , making observations and so forth . It aims to provide opportunities for students to answer and prove the truth of the hypotheses that have been proposed previously , 4) Data Analysis (dataprocessing) : Students processing (check , mengkalifikasikan , tabulating , and so on) all the data and information obtained and interpret the level of trust particular , 5) Verify (verification) : students are given directives to check the hypotheses that have been made at the beginning of the student activities if the hypothesis is proven / not based on the results of data processing and interpretation of data / information , 6) generalization (generalization) : students are directed to learn to draw generalizations / conclusions based hasilverifikasi has been done

The Excess of Discovery Learning

Here are some of the advantages of teaching and learning by discovery:

- a. Discovery strategy in the delivery of materials, use of activities and hands-on experience. Activities and experiences that will be of more interest to students and allow the formation of abstract concepts that have meaning.
- b. Discovery strategy is more realistic and has meaning. Therefore, the students can work directly with real-world examples. They directly apply various testing materials provided by the teacher, so that they can work in accordance with the intellectual abilities possessed.
- c. Discovery strategy is a model of problem solving. The langsung students apply the principles and the first step in solving the problem. Through this strategy, they have the opportunity to learn more intense in solving masalah, so it can be useful in dealing with life in the future.
- d. Discovery strategy that focuses on the ability to solve a problem very relevant to today's developments, which we are required to think about a solution-based problem that occurs in the midst of society. That is why, discovery strategy needs to be actualized in real life, so as to allow students to answer more complex life issues.
- e. With a direct transfer, then the activity discovery strategy will be more easily absorbed by the students in understanding the specific conditions relating to learning activities.

- f. Discovery strategy provides many opportunities for students to be directly involved in learning activities. Such activities would be much raised up the motivation to learn, as tailored to the interests and needs of their own.

Based on the advantages and limitations of the discovery of course, we can draw the conclusion that the discovery involve students directly in the learning process, not always facilitate learning. Limitations discovery method becomes a problem of its own strategy in learning. Therefore, the advantages and limitations of discovery learning method requires a continuous communication with each other and in line with their interests and needs in understanding the discovery as a learning strategy.

DISCUSSION

Place and Time Research:

research was conducted at SMAN 68 Jakarta in class X Science 1 academic year 2013/2014. implementation of the research conducted in October - November 2014. SMAN 68 Jakarta is located at 18 Salemba Raya, Central Jakarta.

Subject Research:

Subjects in the study were students of class X science 1 SMAN 68 academic year 2013/2014, amounting to 36 students. The reasons take on the subject of this study is that during the process of learning takes place most students seem enthusiastic in following the lessons, seen from the lack of involvement of the student in the teacher asked the circular motion of the material that is less understandable, and less able to respond to the feedback given by the teacher. Working knowledge of the students in a circular motion exercises also matter only to the extent that teachers teach, students are not able to resolve the matter in another form.

Research Methods;

research used in this study is a classroom action research method that aims to improve or enhance the quality of classroom practice. Action research begins with action planning (planning), action (acting), observation (observing), and reflection (reflecting).

Pre Research; On the pre study, researchers conducting observations of classroom teaching and learning activities. The researcher acted as a teacher, as well as implementing activities planner. Researchers working with the teachers tutor observation, action plan, implement activities, collect data and analyze it, and then the data is used as an ingredient in early research into data and student learning outcomes.

1. cycle I

a) Planning Phase Actions



In the action planning stage teachers make data collection instruments such as observation sheets, and achievement test worksheet learners. Creating Learning Implementation Plan (RPP) in accordance with the method of discovery learning and adjusting to the material that will be presented in the learning process.









Dated 14th of November 2013. Students, lecturer, and tutors teachers were discussing action planning.



b) Implementation phase

In the implementation phase of teacher learning using discovery learning method with the following steps:

NO	Activities	Learning Activities
1	(Observing)	<p>Observed a linear relationship with the angular velocity speed 15th of November 2013. Teacher describes the relationship linear velocity with angular velocity using props</p> 
		 <p>Observing the relationship of some gear video 15th of November 2013. Students watched the video.</p>

		<p>Observe demonstrations wheel rotation 15th of November 2013. Students observe a demonstration of wheel rotation</p> 
2	(Questioning)	 <p>Asking relationship concentric wheels, the wheels intersect, and the wheels are connected by a chain 15th of November 2013. Students ask to teachers about the relationship model of the wheels</p>
		 <p>Asking the angular velocity of the wheels are connected with different radians 15th of November 2013. Students asked about problems in daily life</p>

		<p>Class discussion about the implementation and the concept of circular motion on wheels 15th of November 2013. Students discuss the implementation and the concept of circular motion on wheels</p> 
3	(Experimenting)	<p>Experimenting relationships wheels of a bicycle tire rotation to determine the linear velocity and angular Velocity</p>  <p>5th of November 2013. Students perform experiments themselves, once that is done in groups</p>
4	(Associating)	<p>Guiding students (groups) to analyze and associate in daily life</p>  <p>15th of November 2013. Teachers guide to each group to analyze the data and associate in daily life</p>

		 <p>Summing up the results of the analysis carried out by learners (group) 15th of November 2013. Students present the results of the discussion in front of the class</p>
5	(Communicating)	<p>Presenting the results of the demonstration students in groups to solve some problems in the exercises.</p>  <p>15th of November 2013. Students completing the exercises in front of the class.</p>

c) Phase Observations

Teachers observe all the events and activities that occur during the learning process by using the observation sheet measuring skills and formative tests / quizzes end of cycle I. The results of the observations and the results of the quiz the first cycle is the basis for the next cycle does reflection. In observations, the things noted by researchers is the process of action learning, the effects of the act of learning, the environment and obstacles that arise in the learning process.

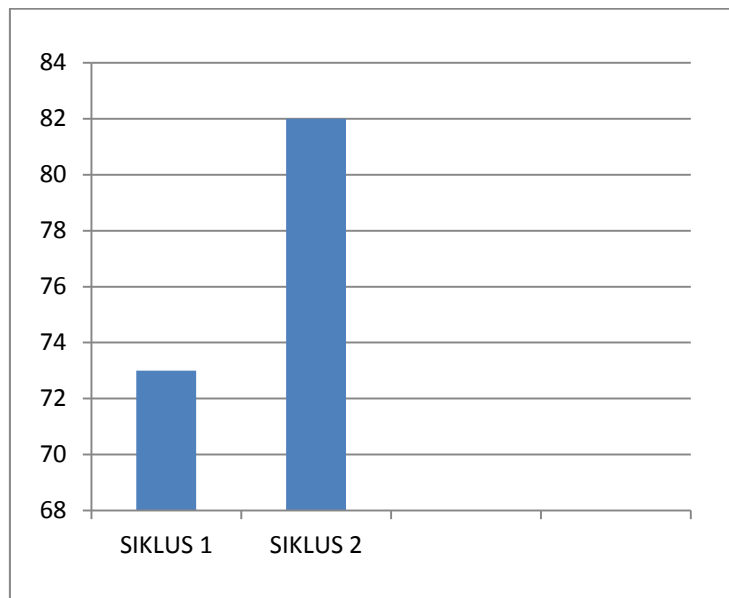


d) Phase Reflection

Reflection is made to process and analyze the data obtained in the first cycle, making learning and revising conclusions because there are

Graph physics student learning outcomes

This research was supported by the results of interviews with some objects such as student and teacher. The results of the interview as follows deficiencies corrected and then plan the second cycle.

**Documentation**

14th of November 2013





15th of November 2013. Activities in the classroom, the students presented the results of the discussion

CONCLUSION

The application of the discovery learning method can improve student learning outcomes physics seen from the increase in the value of cycle 1 to cycle 2. Students are actively engaged in discussions and work kelompok. Kinerja of learners in learning by using the discovery learning method to group work increased. Very enthusiastic learners discuss topics in dikusi and trying to answer and find information about the topic. Active learners group discussions to find out the answer to the question asked earlier.

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